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MCCAIG, BRIAN A				
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

# Office Action Summary

**Application No.**

10/594,451

**Applicant(s)**

KIRIYAMA ET AL.

**Examiner**

BRIAN MCCAIG

**Art Unit**

1797

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 11 May 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1,2 and 4-16 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,2 and 4-16 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-8508)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

**DETAILED ACTION**

1. This Office action is based on the 10/594451 filed September 26, 2006, and amended May 11, 2009.
2. Amendment of claims 2 and 4-7; cancellation of claim 3; and addition of claims 8-16 are noted.
3. New grounds of rejection follow.

***Response to Amendment***

***Claim Objections***

4. Claim 6 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. Currently, it is not clear whether claim 6 depends on claim 4 or depends on another claim that is not referenced.

***Claim Rejections - 35 USC § 102***

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. **Claims 1-2 and 7-11 rejected under 35 U.S.C. 102(b) as being anticipated by Fujikawa et al (US 2003/0173256 A1).**
7. With respect to claims 1 and 9-11, Fujikawa et al discloses a catalyst for hydrotreating a hydrocarbon oil, which comprises an inorganic oxide support and having provided thereon:
  - a. at least one selected from metals in the Group 6 of the periodic table in an amount of from 10 to 30% by weight,

- b. at least one selected from metals in the Group 8 of the periodic table in an amount of from 1 to 15% by weight, and
- c. carbon derived from an organic acid such as citric acid in an amount of from 2 to 14% by weight, in terms of respective oxides on the basis of the catalyst.

wherein the catalyst has a specific surface area of from 220 to 300 m<sup>2</sup>/g, a pore volume of from 0.35 to 0.6 ml/g, and a mean pore diameter of from 60 to 95 angstroms [all contained in abstract & paragraphs 0083-0087].

8. Fujikawa et al also discloses that the support contains a phosphorus oxide in amounts less than 15% by weight [see catalysts A-H in Table 1], wherein the word "containing" is interpreted to mean "holding within fixed limits or capable of holding." In this case, while the oxide support of Fujikawa et al does not contain phosphorus oxide, in the sense of "having within itself or having as component or constituent parts," which is another definition of containing, the reference discloses that the phosphorus oxide is contained by the support via ion exchange, for example [see examples 1 & 2].

9. With respect to claim 2, Fujikawa et al discloses a ratio by weight between the metal in Group 8 of the periodic table and the metal in Group 6 of the periodic table as a value of  $[(\text{metal in the Group 8})/(\text{metal in the Group 8}) + (\text{metal in the Group 6})]$  is from 0.1 to 0.25 in terms of the respective oxides [paragraph 0056].

10. With respect to claim 7, Fujikawa et al discloses that the catalytic reaction is carried out at a hydrogen partial pressure of from 3 to 8 MPa, a temperature of from 300 to 420°C, and a liquid hourly space velocity of from 0.3 to 5 hr<sup>-1</sup> [abstract].

11. With respect to claim 8, Fujikawa et al also discloses that the content of the Group VI metal is from 10 to 30% by weight [paragraphs 0050 & 0051], which renders obvious the required weight ratio of P<sub>2</sub>O<sub>5</sub>/MoO<sub>3</sub> in light of the content of the phosphorus oxide discussed previously.

***Claim Rejections - 35 USC § 103***

12. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

13. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

- a. Determining the scope and contents of the prior art.
- b. Ascertaining the differences between the prior art and the claims at issue.
- c. Resolving the level of ordinary skill in the pertinent art.
- d. Considering objective evidence present in the application indicating obviousness or nonobviousness.

14. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

15. **Claims 1-2 and 4-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fujikawa et al (US 2003/0173256 A1) in view of Choca (US 4066572).**

16. With respect to claims 1, 9-10, and 13-14, Fujikawa et al discloses a catalyst for hydrotreating a hydrocarbon oil, which comprises an inorganic oxide support and having provided thereon:

- a. at least one selected from metals in the Group 6 of the periodic table in an amount of from 10 to 30% by weight,

- b. at least one selected from metals in the Group 8 of the periodic table in an amount of from 1 to 15% by weight, and
- c. carbon derived from an organic acid such as citric acid in an amount of from 2 to 14% by weight, in terms of respective oxides on the basis of the catalyst.

wherein the catalyst has a specific surface area of from 220 to 300 m<sup>2</sup>/g, a pore volume of from 0.35 to 0.6 ml/g, and a mean pore diameter of from 60 to 95 angstroms [all contained in abstract & paragraphs 0083-0087].

17. Fujikawa et al also discloses that 1.5 to 6% by weight of a phosphorus oxide is impregnated on the catalyst support [paragraph 0078]. However, the reference does not appear to explicitly disclose that the catalyst support contains a phosphorus oxide in an amount of 15% by weight or less on the basis of the support, wherein contains means "having within itself or having as component or constituent parts."

18. However, Choca, which is concerned with the catalyst supports for hydrotreatment processes, discloses a phospho-alumina catalyst support suitable for desulfurization with Group VI and Group VIII metals [column 1, lines 45-55 & column 2, lines 10-19], in which the phosphorus oxide is present in an amount ranging from 5 to 30% by weight [column 2, lines 10-19; column 6, lines 45-53; and column 7, lines 27-34; claim 3]. The catalytic metals of Choca and Fujikawa et al are the same being Group VI and Group VIII metals that are impregnated onto the catalyst support by similar means [see Choca column 7, lines 26-40 and Pessimisis (US 3232887) referenced therein, especially column 4, lines 26-59 of Pessimisis; see also paragraph 0097 of Fujikawa et al].

19. At the time of the invention, it would have been obvious to one of ordinary skill in the art to modify the catalyst of Fujikawa et al with the catalyst support of Choca in order to increase the size of the pore diameter of the support so that desulfurization activity may increase by permitting diffusion of sulfur catalysts into the catalyst pores. Therefore, the invention as a whole would have been *prima facie* obvious to one of ordinary skill in the art at the time the invention was made.

20. With respect to claim 2, Fujikawa et al discloses a ratio by weight between the metal in Group 8 of the periodic table and the metal in Group 6 of the periodic table as a value of  $[\text{metal in the Group 8}]/([\text{metal in the Group 8}] + [\text{metal in the Group 6}])$  is from 0.1 to 0.25 in terms of the respective oxides [paragraph 0056].
21. With respect to claims 4, 6, and 16, Fujikawa et al discloses the use of an organic acid [paragraphs 0080-0081, 0083-0084, and 0086], and Choca discloses calcining the support at a temperature of about 565° C for 3 hours [column 5, line 22].
22. With respect to claims 5 and 15, Fujikawa et al discloses that the catalytic support is prepared by a method of kneading the starting materials [paragraphs 0114 and 0118].
23. With respect to claim 7, Fujikawa et al discloses that the catalytic reaction is carried out at a hydrogen partial pressure of from 3 to 8 MPa, a temperature of from 300 to 420°C, and a liquid hourly space velocity of from 0.3 to 5 hr<sup>-1</sup> [abstract].
24. With respect to claims 8 and 12, reference is made to the discussion of claim 1. Fujikawa et al also discloses that the content of the Group VI metal is from 10 to 30% by weight [paragraphs 0050 & 0051], which renders obvious the required weight ratio of P<sub>2</sub>O<sub>5</sub>/MoO<sub>3</sub> in light of the content of the phosphorus oxide discussed previously.

### ***Response to Arguments***

25. The applicant has argued that combining Fujikawa et al with Choca would cause the pore size of the catalyst support to increase beyond the pore size permitted by Fujikawa et al.
26. The applicant's argument is not persuasive because there is no evidence that combining Fujikawa et al with Choca would result in the assertion by the applicant. Fujikawa et al discloses an ideal average pore diameter of 65 to 95 angstroms. When the pores are too small, reactants are less likely to diffuse to the pores resulting in decreased desulfurization activity [paragraph 0080 of Fujikawa et al]. The addition of phosphorus to the support controls the average pore diameter to enhance diffusion of reactions to the pores [column 2, lines 4-8 of Choca].

Nearly all the exemplary catalysts of Fujikawa et al in examples 1-9 summarized in Table 1 have average pore diameters of 75 angstroms or less. Therefore, the addition of the phosphorus oxide to the catalyst would increase the average pore diameter, but there is no evidence that adding the phosphorus oxide of Choca in the amounts taught therein would increase the average pore diameter above that disclosed in Fujikawa et al. While Choca does disclose the effects of adding phosphorus oxides to catalyst supports in examples I-VII with results summarized in Table I, the average pore diameters reported in Table I are determined by nitrogen adsorption. The average pore diameters of Fujikawa et al are determined by mercury intrusion. The results of the two methods are not comparable since they are based on different processes as evidenced by Murray et al in *Langmuir* (1999, vol 15, no 23, pgs 8155-8160) [see, e.g., paragraph 4] or Tsakiroglou et al in *Materials, Interfaces, and Electrochemical Phenomena* (2004, vol 50, no 2, pgs 489-510). For example, Murray et al discloses that mercury intrusion is a penetration process in contrast to nitrogen desorption, which is a phase equilibrium process. The former measures the accessibility of the pore network to a meniscus of a particular size. The latter measures the fraction of the pore network within which a stable meniscus of a stable size can form. The two processes can only be compared directly if the experimental data from both are presented in the same terms by transforming the mercury intrusion data into coordinates of sorption isotherms, for example. Similarly, Tsakiroglou discloses that different pore size distributions of the same material can arise because of the two techniques of nitrogen desorption and mercury intrusion are developed from differentiation of adsorption/desorption isotherms and porosimetry curves, respectively.

27. The applicant has argued that the catalyst of the claimed invention produces unexpectedly superior results when compared to an exemplary catalyst of Fujikawa et al.

28. The applicant's argument is not persuasive because it does not show unexpectedly superior results compared to a catalyst exemplary of Fujikawa et al modified by Choca.



***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to BRIAN MCCAIG whose telephone number is (571) 270-5548. The examiner can normally be reached on M-F 8-430.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn Caldarola can be reached on (571) 272-1444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

BAM  
7/7/2009

/ROBERT J. HILL, JR/  
Primary Examiner, Art Unit 1797